Fisheries and Oceans Canada | Pêches et Océans Canada
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Canadian Science Advisory Secretariat (CSAS)

Proceedings Series 2015/056

Pacific Region

Proceedings of the Pacific regional peer review on the Review of Assessment of Longnose Skate and Big Skate stocks in areas 4B, 3CD, 5AB and 5CDE in British Columbia

May 16, 2013
Nanaimo, BC

Chairperson: Andrew M. Edwards
Editors: Andrew M. Edwards and Lisa C. Lacko

Fisheries and Oceans Canada
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December 2015

Canada

Foreword

The purpose of these Proceedings is to document the activities and key discussions of the meeting. The Proceedings may include research recommendations, uncertainties, and the rationale for decisions made during the meeting. Proceedings may also document when data, analyses or interpretations were reviewed and rejected on scientific grounds, including the reason(s) for rejection. As such, interpretations and opinions presented in this report individually may be factually incorrect or misleading, but are included to record as faithfully as possible what was considered at the meeting. No statements are to be taken as reflecting the conclusions of the meeting unless they are clearly identified as such. Moreover, further review may result in a change of conclusions where additional information was identified as relevant to the topics being considered, but not available in the timeframe of the meeting. In the rare case when there are formal dissenting views, these are also archived as Annexes to the Proceedings.

Published by:

Fisheries and Oceans Canada
Canadian Science Advisory Secretariat
200 Kent Street
Ottawa ON K1A 0E6

http://www.dfo-mpo.gc.ca/csas-sccs/
csas-sccs@dfo-mpo.gc.ca

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ISSN 1701-1280

Correct citation for this publication:

DFO. 2015. Proceedings of the Pacific regional peer review on the Review of Assessment of Longnose Skate and Big Skate stocks in areas 4B, 3CD, 5AB and 5CDE in British Columbia; May 16, 2013. DFO Can. Sci. Advis. Sec. Proceed. Ser. 2015/056.

TABLE OF CONTENTS

SUMMARY iv

SOMMAIRE v

INTRODUCTION 1

REVIEW 2

PRESENTATION OF WORKING PAPER 2

WRITTEN REVIEWS 3

Cindy Tribuzio 3

Chris Grandin 3

GENERAL DISCUSSION 3

CONCLUSIONS 5

RECOMMENDATIONS & ADVICE 5

ACKNOWLEDGEMENTS 6

REFERENCES 6

APPENDIX A: AGENDA 7

APPENDIX B: PARTICIPANTS 9

APPENDIX C: TERMS OF REFERENCE 10

APPENDIX D: SUMMARY OF THE WORKING PAPER 12

APPENDIX E: WRITTEN REVIEWS 13

SUMMARY

These Proceedings summarize the relevant discussions and key conclusions that resulted from a Fisheries and Oceans Canada (DFO), Canadian Science Advisory Secretariat (CSAS) Regional Peer Review meeting on May 16, 2013 at the Pacific Biological Station in Nanaimo, B.C. One working paper focusing on Big Skate (*Raja binoculata*) and Longnose Skate (*R. rhina*) was presented for peer review.

In-person and web-based participation included Fisheries and Oceans Canada (DFO) staff from the Science Sector and the Fisheries and Aquaculture Management Sector, and external participants from the commercial and recreational fishing sectors, provincial government and US government.

The conclusions and advice resulting from this review will be provided in the form of a Science Advisory Report providing advice to Fisheries and Aquaculture Management to inform fishery planning.

The Science Advisory Report and supporting Research Document will be made publicly available on the Canadian Science Advisory Secretariat (CSAS) website.

Compte rendu de l'examen par les pairs de la région du Pacifique de l'Examen de l'évaluation des stocks de pocheteau long-nez et de raie biocellée dans les zones 4B, 3CD, 5AB et 5CDE en Colombie-Britannique

SOMMAIRE

Le présent compte rendu résume l'essentiel des discussions et conclusions de la réunion régionale d'examen par des pairs de Pêches et Océans Canada (MPO) et du Secrétariat canadien de consultation scientifique (SCCS) qui a eu lieu le 16 mai 2013 à la station biologique du Pacifique de Nanaimo, en Colombie-Britannique. Un document de travail sur la raie biocellée (*Raja binoculata*) et le pocheteau long-nez (*R. rhina*) a été soumis à l'examen par les pairs.

Au nombre des participants qui ont assisté à la réunion en personne ou par conférence Web, on comptait des représentants des secteurs des Sciences et de la Gestion des pêches et de l'aquaculture de Pêches et Océans Canada (MPO), ainsi que des secteurs de la pêche commerciale et récréative, du gouvernement provincial et du gouvernement des États-Unis.

Les conclusions et avis découlant de cet examen seront présentés sous la forme d'un avis scientifique à l'intention de Gestion des pêches et de l'aquaculture afin d'orienter la planification des pêches.

L'avis scientifique et le document de recherche à l'appui seront rendus publics sur le site Web du calendrier des avis scientifiques du Secrétariat canadien de consultation scientifique (SCCS).

INTRODUCTION

A Fisheries and Oceans Canada (DFO) Canadian Science Advisory Secretariat (CSAS), Regional Peer Review meeting was held on May 16, 2013 at the Pacific Biological Station in Nanaimo, British Columbia, to review stock assessments of Big Skate and Longnose Skate stocks.

The Terms of Reference for the science review (Appendix A) were developed in response to a request for advice from Fisheries and Aquaculture Management. Notifications of the science review and conditions for participation were sent to representatives with relevant expertise from DFO, First Nations, commercial and recreational fishing sectors, environmental non-governmental organizations, provincial and U.S. government and academia.

The following working paper (WP) was prepared and made available to meeting participants prior to the meeting (summary provided in Appendix B):

Big Skate (*Raja binoculata*) and Longnose Skate (*R. rhina*) stock assessments for British Columbia by J.R. King, A.M. Surry, S. Garcia and P.J. Starr. CSAP WP2013/P25.

The meeting Chair, Andrew Edwards, welcomed participants, reviewed the role of CSAS in the provision of peer-reviewed advice, and gave a general overview of the CSAS process. The Chair discussed the role of participants, the purpose of the various resulting meeting publications (Science Advisory Report, Proceedings and Research Document), and the definition and process around achieving consensus decisions and advice. Everyone was invited to participate fully in the discussion and to contribute knowledge to the process, with the goal of delivering scientifically defensible conclusions and advice. It was confirmed with participants that all had received copies of the Terms of Reference, Agenda and the working paper.

The Chair reviewed the Agenda (Appendix C) and the Terms of Reference for the meeting, highlighting the objectives, and identified Lisa Lacko as the Rapporteur. The Chair then reviewed the ground rules and process for exchange, reminding participants that the meeting was a science review and not a consultation. The room was equipped with microphones to allow remote participation by web-based attendees, and in-person attendees were reminded to address comments and questions so they could be heard by those online.

Members were reminded that everyone at the meeting had equal standing as participants and that they were expected to contribute to the review process if they had information or questions relevant to the paper being discussed. In total, 21 people participated in the meeting (Appendix D).

Participants were informed that Cindy Tribuzio and Chris Grandin had been asked before the meeting to provide detailed written reviews for the working paper to assist everyone attending the peer-review meeting. Participants were provided with copies of the written reviews (Appendix E).

The conclusions and advice resulting from this review will be provided in the form of a Science Advisory Report to Fisheries and Aquaculture management to inform fishery planning. The Science Advisory Report and supporting Research Document will be made publicly available on the Canadian Science Advisory Secretariat (CSAS) website.

REVIEW

Working Paper: Big Skate (*Raja binoculata*) and Longnose Skate (*R. rhina*) stock assessments for British Columbia. CSAP WP2013/P25.

Rapporteur: Lisa Lacko

Presenter(s): Jackie King, Maria Surry

PRESENTATION OF WORKING PAPER

Two authors gave a presentation of the working paper, the Abstract for which appears in Appendix D. Big Skate (*Raja binoculata*) and Longnose Skate (*R. rhina*) are data-poor stocks that have a long commercial catch history, with the fishery commencing in 1870 and the first recorded landing in 1911. The authors presented catch data from 1996 through 2011 as a modern data series that included species identification. The modern data series is dominated by trawl catches, and is considered reliable due to 100% at-sea observer coverage in the trawl fishery. Previous to those years, they suggested that the total catch numbers were likely higher than records indicate. The authors showed a timeline of changes in management procedures and fluctuations in market values that have made it difficult to produce a standardized catch-per-unit-effort series.

The working paper examined many methods to assess the stocks including a Baysian surplus production model, a depletion-corrected average catch (DCAC) analysis, a Catch-MSY (where MSY is maximum sustainable yield) approach, a mean historic catch series, and abundance indices based on fishery-independent surveys. Based on tagging results and fishery spatial patterns, four Skate Management Areas were proposed: 3CD (including minor areas 19 and 20 of 4B); 5AB (including minor area 12 of 4B); 5CDE; 4B (minor areas 13 – 18, 28, 29 only). Coastwide harvest advice was provided for Longnose Skate in addition to the four proposed Skate Management Areas. The research survey data in the 2013 assessment included eight trawl surveys (NMFS Triennial Trawl Survey, QCS Shrimp Trawl Survey, QCS Synoptic Trawl Survey, Hecate Strait Multispecies Assemblage Trawl Survey, Hecate Strait Synoptic Trawl Survey West Coast Haida Gwaii Synoptic Trawl Survey, WCVI Shrimp survey and WCVI synoptic survey) and three longline surveys (IPHC Standardized Assessment Longline Survey, PHMA Longline Survey and Inshore Rockfish Longline Survey). In response to both reviewers' comments, the authors had included surveys with coefficients of variation of <0.4, rather than the original stricter criteria of <0.2.

The authors' conclusions included four areas for further discussion:

1. The proposed Skate Management Areas as identified in the assessment.
2. The mean historic catch is recommended for selection of total annual harvest yields. The Catch-MSY approach was identified as a newly developed application for providing harvest advice. Thus, the upper mean MSY estimates in Table 7 are presented as reasonable harvest limits to consider in conjunction with the mean catch model.
3. The catch-MSY approach in Table 7 is presented in three time series for long-term (1996-2011), 10-year (2002-2011) and 5-year (2007-2001) periods.
4. The discard mortality of 10% for longline gear is based on expert opinion and ecological knowledge, not scientific study.

WRITTEN REVIEWS

Cindy Tribuzio

United States Department of Commerce, National Oceanic & Atmospheric Administration, National Marine Fisheries Service, Alaska Fisheries Science Center.

The reviewer presented slides based on her written review (which is given in Appendix E). She was in agreement with the assessment approach based on the Catch-MSY analysis and with the general conclusions. Further discussion took place in the following areas:

1. The reviewer suggested the authors should include maps that show survey catch overlaid on fishery catch. The authors agreed to look at producing skate distribution maps.
2. The reviewer stated that the tagging data suggest the existence of discrete stocks of Big Skate. She inquired about the availability of genetic studies to support this statement. The authors affirmed that no genetics were available.
3. The reviewer thought the catch data to be less reliable than the survey data due to the changes in management and market values. The authors clarified the three time series used in the assessment based on the robustness of the catch data.
4. The reviewer did not agree with the 10% discard rate used in the longline fishery and thought it was too low. No change to the 10% discard rate was made at this time.

Chris Grandin

Groundfish Section, Marine Ecosystems and Aquaculture Division, Pacific Biological Station, Fisheries and Oceans Canada.

The reviewer was in agreement with the assessment approach for Big Skate and Longnose Skate as data-limited species (review given in Appendix E). Further discussion took place in the following areas:

1. The reviewer pointed out that in Table 7, the advice provided showed that historical Big Skate catches are within the limits of the MSY range given by the Catch-MSY method, but historic Longnose Skate catches are not. The response from authors later in the discussion indicated that the Catch-MSY approach for Longnose Skate was presented for managers to augment the long term mean historic catch model.
2. The reviewer commented on the trend analyses that showed no significant trend in the survey time series with a coefficient of variation (CV) <0.2. He suggested including larger CVs. The authors clarified that they had now used a CV limit of <0.4.
3. The review included discussion on Appendix G.2.1.5. The reviewer suggested that the authors add the mesh size or gear type as a GLM parameter, as changes in gear contribute to the DCAC and surplus production model results. The authors acknowledged it was an issue but said they couldn't quantify it because the data to do this type of analysis do not exist.

GENERAL DISCUSSION

1. A participant thought that the authors should include a summary table showing the available biological data. The authors agreed.
2. The spatial location of egg cases were addressed next. Comments from industry indicate that there are abundant egg cases located by Two Peaks in shallow waters (6-8 fathoms)

among the kelp and in Hecate Strait in less than 20 fathoms waters. Further, industry stated that egg cases are located in areas that are not trawled, thus commercial fishery logbooks would not be a potential data source.

Focused discussion, based on the four earlier points raised by the authors:

1. The proposal of new Skate Management Areas as identified in the assessment.

Concerns were raised about linking management area 5E to 5CD for Big Skate. It was suggested that 5E should be managed separately for this species as catches off Rennel Sound would would be large in a small shelf area, implying high local exploitation rates. Operational workload and fishery distributions were discussed as factors to keep 5CDE together.

Discussion took place on the proposed Skate Management Area 3CD to include PFMAs 19 and 20 and to skate management area 5AB to include PFMA 12. It was determined that the ecological science and fishery distribution were two important considerations that were used in the formulation of these skate management areas.

The same management areas were recommended for Longnose Skate in the absence of tagging studies. It was noted that the coastwide mean commercial trawl and line catch were included in Table 7 as requested by industry, as Longnose Skate catches are not spatially aggregated.

Participants accepted the four proposed Skate Management Areas for both Big Skate and Longnose Skate.

2. The mean historic catch was recommended for selection of total annual harvest yields. The Catch-MSY approach was identified as a newly developed application for providing additional harvest advice. The upper mean Catch-MSY estimates in Table 7 were presented as reasonable maximum harvest yields to consider in conjunction with the mean historic catch model.

Industry voiced their concerns about the low catches in the Catch-MSY table for Longnose Skate. The authors stated that the Catch-MSY approach for Longnose Skate is presented for managers to augment of the long term mean historic catch model. This was discussed by the authors while conducting the assessment and not included in the document. The authors noted that relevant emails could perhaps be included in the stock assessment document.

Other participants voiced their concerns on the suggestions of harvest advice from science within the document.

The participants decided that the authors should modify their advice on harvest yields from the conclusions (first paragraph, third sentence), by not stating that catch should remain below specified values. The relevant text is:

Original: "The total annual harvest yields should be selected based on mean historic catch and should not exceed the upper range identified by the Catch-MSY approach."

New: "The total annual harvest yields should be selected based on mean historic catch with consideration given to the results of trend analyses applied to research survey indices and to the range of MSY estimates identified by the sensitivity analyses of the Catch-MSY approach."

This revision in wording was considered appropriate since this was the first time the Catch-MSY approach was being used to provide advice. The Catch-MSY results were extremely sensitive to assumptions and so could not be used as the sole basis of advice to managers. Further, it was recommended that a committee be formed to explore the methodology through simulation testing of the Catch-MSY approach.

3. The Catch-MSY approach in Table 7 is presented in three time series for long-term (1996-2011), 10-year (2002-2011) and 5-year (2007-2001).

Participants decided to leave all three time series in Table 7.

4. The discard mortality rate of 10% for longline gear.

The rate of 10% was based on expert opinion and industry feedback. However, participants agreed that the following sentence be removed from the conclusions, since it should not be used to provide advice (first paragraph, fourth sentence):

"Discard mortality rates applied in this document are likely reasonable rates to apply in commercial trawl (50%) and commercial line (10%) fisheries".

CONCLUSIONS

The Working Paper was accepted subject to minor revisions.

Several methods (including Bayesian surplus production modeling and data-limited approaches) were used to try and provide detailed stock assessments for these data-limited species. None were able to provide reliable estimates of biomass, preventing the evaluation of current and future stock status relative to reference points.

In lieu of specific harvest advice, the assessment summarized average historic catches relative to the ranges of MSY estimated from the Catch-MSY approach to provide guidance for setting harvest levels. The use of average catches to set potential yields is consistent with the "*Fishery Decision-making Framework Incorporating the Precautionary Approach*" (DFO, 2009). For stocks that appear to have stable abundance indices, but lack estimates of stock status based on model results, historical fishing mortality can be used as yields limits (DFO, 2009). The use of average historical catch levels as harvest yield advice requires that stocks appear stable. The results of trend analyses on relative abundance indices from selected research survey series (mean CV < 0.4) were provided to assess relative stock stability.

For Skate Management Area 4B which has insufficient data to estimate ranges of MSY or to assess stock trends, mean catches for each species were summarized for the long-term (1996 – 2011), 10 year (2002 – 2011) and 5 year (2007 – 2011) periods. In addition, spatial distributions of commercial trawl and survey catches were provided to show where fishing occurs, where skates are encountered, and their relative spatial overlap.

RECOMMENDATIONS & ADVICE

It was recommended that harvest yields should be selected based on mean historic catch, with consideration given to results of trend analyses of research survey indices and to the ranges of MSY estimates identified by the new Catch-MSY approach. The Catch-MSY results were extremely sensitive to assumptions and so could not be used as the sole basis of advice to managers.

For area 4B, insufficient data existed for Catch-MSY or survey trend approaches. The recent average catch is only 9 t for both species combined, and information on mean historic catches and spatial distribution was provided.

For Big Skate, there were no significant trends in abundance indices from surveys. For all Skate Management Areas, average historical catches were below the maximum MSY estimate from the Catch-MSY results.

For Longnose Skate, trawl survey data indicated statistically significant declines in abundance; no significant trends were detected for the longline survey data. For all Skate Management Areas (and the coastwide aggregate), average historical catches exceeded the maximum MSY estimate from the Catch-MSY results.

ACKNOWLEDGEMENTS

The Chair thanks Cindy Tribuzio and Chris Grandin for their reviews, all participants for their involvement, and Lisa Lacko for being an excellent rapporteur and writing up some of these proceedings. The assistance of Nic Dedeluk in providing support for meeting logistics is greatly appreciated.

REFERENCES

DFO. 2009. A fishery decision-making framework incorporating the Precautionary Approach. (Accessed January 2015)

APPENDIX A: AGENDA

Regional Peer Review Meeting (RPR)

Assessment of Longnose Skate and Big Skate stocks in areas 4B, 3CD, 5AB and 5CDE in British Columbia

May 16, 2013

Pacific Biological Station
Nanaimo, British Columbia

Chairperson: Andrew Edwards
Rapporteur: Lisa Lacko

DAY 1 - May 16, 2013

Time	Subject	Presenter
	Introductions	
0900	Review agenda & housekeeping CSAS overview & procedures	Chair
0915	Review Terms of Reference	Chair & participants
0930	Presentation of working paper	Authors
1020	Questions of clarification	Participants
1030	**Break**	
1045	First review	Cindy Tribuzio, Auke Bay Laboratories, NOAA, USA (via Webinar).
1130	Second review	Chris Grandin, Groundfish Section, Pacific Biological Station
1215	**Lunch**	
1300	General questions and discussion	Participants
	1. Are the data and methods adequate to support the conclusions?	
1400	2. Does the advice reflect the uncertainty in the data, analysis or process?	Participants

Time	Subject	Presenter
	3. Does the paper meet the objectives in the Terms of Reference?	
1430	**Break**	
1445	Decision on acceptability of working paper. Consensus regarding: • Key Findings & Conclusions • Uncertainties • Ecosystem Considerations • Advice for Management • Recommendations for Future Work Summary of conclusions and advice – what to include in the Science Advisory Report	Participants
1630	**Adjourn**	

APPENDIX B: PARTICIPANTS

Last Name	First Name	Affiliation
DFO		
Ackerman	Barry	Groundfish Management
Caron	Chantelle	Groundfish Management
Edwards	Andrew	Science, Groundfish Section
Forrest	Robyn	Science, Groundfish Section
Grandin	Chris	Science, Groundfish Section
Haigh	Rowan	Science, Groundfish Section
Hargreaves	Marilyn	Science, CSAP
Houston	Kim	Science, National Head Quarters
King	Jackie	Science, Groundfish Section
Lacko	Lisa	Science, Groundfish Section
Surry	Maria	Science, Groundfish Section
Workman	Greg	Science, Groundfish Section
Yamanaka	Lynne	Science, Groundfish Section
External		
Chalmers	Dennis	Province of BC
Garcia	Sabrina	Contractor
Harling	Wayne	Sport Fishing Advisory Board (SFAB)
Krause	Gary	Canadian Groundfish Research and Conservation Society - Trawl
Mose	Brian	Commercial Industry Caucus - Trawl
Sporer	Chris	Pacific Halibut Management Association
Starr	Paul	Candian Groundfish Conservation Society & External Expert
Tribuzio	Cindy	National Oceanic and Atmospheric Administration, Juneau

APPENDIX C: TERMS OF REFERENCE

Review of Assessment of Longnose Skate and Big Skate stocks in areas 4B, 3CD, 5AB and 5CDE in British Columbia

Regional Peer Review Process – Pacific Region

May 16, 2013
Nanaimo, British Columbia

Chairperson: Andrew Edwards

Context

Longnose skate and Big skate are targeted species of commercial importance in the Canadian Pacific groundfish hook and line fleet and trawl fleet. Although a detailed 'Phase 0' assessment for these two skate species was completed in 2001, a full detailed stock assessment has never been done for Pacific stocks. Updated harvest advice is required to ascertain whether current harvest levels are sustainable and compliant with the Fishery Decision-making Framework Incorporating the Precautionary Approach (DFO 2009).

These species have been identified in the Halibut Marine Stewardship Council certification process as a significant component of the Halibut fleet catch. A risk-based assessment is therefore required to maintain certification.

Objectives

Guided by the DFO Sustainable Fisheries Framework, particularly the Fishery Decision-making Framework Incorporating the Precautionary Approach (DFO 2009), meeting participants will review the working paper:

Big skate (Raja binoculata) and Longnose skate (R. rhina) stock assessments for British Columbia. King, J. Surry, M., Garcia, S. and Starr, P. CSAP Working Paper 2013/P25

The working paper will be used to provide advice with respect to the following objectives:

- Recommend reference points consistent with the DFO Precautionary Approach. Include the biological considerations and rationale used to make such a determination.
- Evaluate the current status of the Longnose and Big Skate stocks for Groundfish Management Areas 3CD (including 19 and 20 from 4B), 5AB (including 12 from 4B), the remainder of 4B (Areas 13-18) and 5CDE, relative to the recommended reference points.
- Provide reasons if formal assessment for any stocks is not possible.
- Provide trend information on catch and effort distribution by fleet, provide other rationale for delineating management areas as defined above, and provide advice regarding current trip limits.
- Evaluate the consequences of varying constant catches on future population status over ten years and over approximately one generation, providing decision tables and figures of projected biomass.

Expected Publications

- CSAS Science Advisory Reports
- CSAS Research Documents
- CSAS Proceedings

Participation

- DFO (Science, Oceans, Habitat)
- Aboriginal Communities
- Province of BC
- External Reviewers
- Industry
- Non-governmental Organizations and Other Stakeholders

References

DFO. 2009. A fishery decision-making framework incorporating the Precautionary Approach.

APPENDIX D: SUMMARY OF THE WORKING PAPER

No abstract was given for the working paper. This is the submitted abstract of the Research Document (that is the revised working paper).

Big Skate (*Raja binoculata*) and Longnose Skate (*R. rhina*) are captured and landed by the commercial groundfish trawl and hook-and-line fisheries. Harvest advice was requested to assess whether current harvest levels are sustainable and compliant with the *Fishery Decision-making Framework Incorporating the Precautionary Approach*. This is the first detailed stock assessment undertaken for these Pacific stocks. Several methods were explored for assessing the stock status of Big Skate and Longnose Skate in order to provide harvest advice. A Bayesian surplus production model was investigated for a Big Skate case study, but produced unsatisfactory results for providing fisheries management advice and was not considered further. As such, reliable estimates of biomass could not be produced, and evaluation of current and future stock status relative to fishery and biological reference points was not possible. As an alternative to formal stock assessment models, two data-limited approaches were investigated for a Big Skate case study. The first, Depletion-Corrected Average Catch Analysis, produced a range of potential yield estimates that were above the long-term average catch, with an upper bound that was three orders of magnitude larger than the long-term average catch. Based on these results, this approach was not investigated further. The second data-limited approach, Catch-MSY (maximum sustainable yield) Approach, produced plausible results for a Big Skate case study and was applied to Big Skate and Longnose Skate in all areas. However, results were extremely sensitive to assumptions, without consistent responses across areas or assumption combinations and are not recommended as the sole basis of advice to managers. Harvest yields should be selected based on mean historic catch, with consideration given to results of trend analyses of research survey abundance indices and to the ranges of maximum sustainable yield estimates identified by the Catch-MSY Approach. For Big Skate, there were no significant trends in abundance indices from surveys for all areas and mean historical catches were below the maximum MSY estimate from the catch-MSY results. For Longnose Skate, trawl survey data indicated statistically significant declines in abundance in all areas; however no significant trends were detected for the longline survey data. For all areas, mean historical catches exceeded the upper maximum sustainable yield estimate from the Catch-MSY Approach results.

APPENDIX E: WRITTEN REVIEWS

Dr. Cindy Tribuzio

Centre for Science Advice Pacific

Regional Advisory Process

Date: May 9, 2013

Reviewer: Dr. Cindy Tribuzio, United States Department of Commerce, National Oceanic & Atmospheric Administration, National Marine Fisheries Service, Alaska Fisheries Science Center

Working Paper:

Big skate (*Raja binoculata*) and Longnose skate (*R. rhina*) stock assessments for British Columbia. *King, J. Surry, M., Garcia, S.* and Starr, P. CSAP Working Paper 2013/P25

My comments are provided below. In this document I first answer questions provided to me as the general guidelines for reviewers, and then I offer my comments on the data and methods used.

Responses to General Guidelines for Reviewers

Is the purpose of the working paper clearly stated?

Yes, the purpose of the paper is to assess two data-poor stocks of skate: big skate and longnose skate. The document reviews many methods that were attempted to model the stocks and were ultimately found to be inappropriate, as well as the historical reconstruction of trawl catch.

Are the data and methods adequate to support the conclusions?

The conclusions seem reasonable based on the data and the Catch-MSY approach also seems reasonable. However, the methods used to create the catch time series used in the Catch-MSY method do not seem appropriate at this time. While there is a wide variety of survey data available to examine trends in abundance indices, catch data is less reliable. Because of changes in management and observer coverages, the different times series of catches are difficult to compare. Further the choice of a 10% discard mortality in the longline fleet renders it an insignificant source of catch and thus not apparent in the catch reconstructions, etc. This may substantially bias the management advice.

Are the data and methods explained in sufficient detail to properly evaluate the conclusions?

Mostly. The appendices are informative, and the working paper summarizes the results succinctly. However, some steps are not fully explained. For example, how is r determined? Or why weren't other modeling approaches, such as demographic models examined?

If the document presents advice to decision-makers, are the recommendations provided in a useable form, and does the advice reflect the uncertainty in the data, analysis or process?

It doesn't appear that the results and conclusions in this document provided new insights into management advice. However, I must acknowledge that as a foreign reviewer I am not familiar with the management system. That is not saying that this document did not reach it's goals, management of these species is challenging because of the data limitations. The conclusions of

this document are that management must be based on catch history, data do not support other forms of management at this time.

Can you suggest additional areas of research that are needed to improve our assessment abilities?

Given the poor fit in the GLM catch reconstruction, I would recommend further investigations into methods to estimate historical catch. I would also suggest examining demographic models which only require life history data and risk analyses can also be run using those models.

Comments of data and methods used for the assessment

Input data

The input data used in the assessments include catch time series and survey indices of abundance.

Catch Data:

Catch data: The catch data time series has a number of important caveats. First and foremost is variable data quality (i.e. observer coverage), such that the longest "reliable" time series is the area 4B Option A trawl catch from 1996 – present. The descriptions of the various data qualities associated with the different gears generated some questions: 1) how were the different time series of catch (i.e. differing levels of observer coverage) treated?; 2) How accurate are the electronic monitoring?; and 3) has there been any analysis to compare the electronic monitoring catches to at sea observer catchs? The accuracy of the longline observer/EM data could have a significant impact, particularly in some areas for longnose skate.

The catch reconstructions were generally a poor fit (Appendx figs F9, G9-G20). It doesn't seem like the GLM approach accurately predicted catch and it would be good to further investigate methods for catch reconstruction. Also, line fisheries were ignored in the catch reconstruction, and it seems like that has a potential to be a significant source of catch.

The choice to use 10% discard mortality on the line discards is questionable. As noted in the document, there is not information on the discard mortality, so then why go with a guess that is so non-conservative. At a minimum, 50% seems like a more reasonable starting place. Are there incentives in place to promote "healthy" release of non-target species, which would support a lower discard mortality rate? Besides being quite liberal, a rate that low provides a large buffer in the event a vessel is near it's trip limit but may mask actual catches and potential problems. Further, that low of a discard mortality rate dramatically reduces the catch estimates in areas where line fisheries are more predominant, especially for longnose skate. I strongly recommend rethinking the use of 10% before management decisions are made.

Survey Series:

I don't have a lot of comments on the survey indices at this time. There are multiple surveys available, some more appropriate than others for use in the skate assessments. It does seem that given the high quality data available on the IPHC survey from 2003-present, it would be possible to back calculate the survey index as far as 1997, when they standardized the survey. That would provide a nice annual index as far back as catch data.

Other suggestions:

Because of the data poor nature of these species, demographic modeling may be an approach worth investigating. These models only require life history data, which exists for these species. The models are simple to run (very fast in PopTools) and can provide simulated estimates of sustainable F rates, but also be used to examine the risk. Even though there is not a biomass

estimate available for either species, a risk analysis would be informative as a way of determining how conservative management should be.

Chris Grandin

Centre for Science Advice Pacific

Regional Advisory Process

The authors clearly put a lot of work into this document and I feel they did what they could with these data-limited species. The document was thorough and the analyses sound. The only criticism would be that the document was so thorough that it was difficult to get through all the details in only a week.

This stock assessment was produced to address bycatch issues in the Halibut fishery, in particular to provide advice on the two species' populations relative to the reference points within DFO's precautionary approach to decision making. The authors made their best attempts to do so with these data-limited stocks, by running several analyses serially in a trial-and-error fashion. Although unable to provide the requested information, the authors provided a table of range of MSY values compared with mean historical catches (table 7). Care should be taken if using this table for advice though; historical Big Skate catches are within the limits of the MSY range given by the Catch-MSY method, but historic Longnose Skate catches are not.

GLM (DCAC):

In Appendix G, section G.2.1.5, why was the duration parameter changed to a factor (bins) instead of a continuous variable as it was in the GLM of Appendix F?

Perhaps adding the mesh size or gear type (if the data exist) as a GLM parameter would have helped as the fishery varied so much in this regard over the 2001-2011 period. There is more on this below in the *Comments on meeting minutes* section.

Trend Analysis for Surveys:

The trend analyses show that there are only no significant trends in survey time series, at least for surveys with a CV less than 0.2. It would be interesting to see what happens when this is broadened to include surveys with larger CVs, and also the rationale behind limiting the analysis to surveys with CV < 0.2.

Catch-MSY approach:

The r priors for the two species (Figure L-1) fit well to the output distribution calculated from McAllister's method, although the figure text needs editing to mention the beta distribution fit line for Longnose Skate (it currently says it's a normal line).

Perhaps figures L-3 and L-8, especially the MSY posterior subplots, should be shown in the main document instead of (or as well as) in the appendix if they are the cases of interest to managers.

Table 7 shows the real catch history compared to the Catch-MSY output range. The Catch-MSY method tends to overestimate k, the carrying capacity, and underestimate r, the intrinsic rate of growth, but this effect could effectively cancel out because MSY = rk/4.

Comments on meeting minutes:

In the June 2012 meeting notes (Appendix B.1 page 43) there is mention of using the catch data prior to 1996, which was not recorded by species. Based on this, the authors applied catch ratios of the two species caught after 1996 to pre-1996 catch. Since Big Skate are found in aggregations in key fishing areas, and Longnose Skate are caught incidentally in many areas

(Figures 1 & 2), and because fishing practices and targeting of both species are unknown for this time period, the extrapolation might be over-simplified.

There was a change in gear mesh size in 2004 – 2005 (Appendix B, page 61). This should reduce the data further due to splitting the time series into two which have different selectivities. To complicate things further, this may not have been a fleet wide change. Also, on page 59 there is a hint from industry that some large mesh sizes were used by some fishers which could complicate selectivities further. These unaddressed complexities in selectivity could be partially responsible for the issues the authors had with the surplus production model and the DCAC analyses.

Section B.5 in Appendix B (page 60), there are comments from industry that about 4-5 years ago the processors had a size limit of 30 – 40 cm body length. This would likely have resulted in targeting of fish of large enough size and possibly large, unreported catch in the form of discarded fish which were too small to process.

Other issues:

Was there ever any tagging done for Longnose Skate? If not is there any other data available to determine spawning range for Longnose? There is an explanation of Big Skate tagging in section 1.2 but I did not see anything for Longnose.

In Figure D-1, the red line represents total catch. The trawl and line fisheries prior to 1945 are non-existent yet the total catch is still shown in that period as approximately 100 tonnes. Is there catch not included here that took place? From Figure D-3 it looks like most of it was from area 4B, and in the introduction to Appendix E there is mention of two smaller fisheries located predominately in 4B.

Figure D-2 would be more informative if there were a proportion-of-catch line for skate added to the plot.

Figure 9 in the main body and F-8 in Appendix F have a small problem, the observed catch is different than it is in F-6, F-7, and F-9. It looks like a scaling issue to me.